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ZOOLOGICAL SOCIETY.

October 23, 1838.—William Yarrell, Esq., in the Chair.

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Some specimens of Flying Lemurs (*Galeopithecus*) were upon the table, and in reference to them Mr. Waterhouse stated that his object in bringing them before the Meeting was to notice certain characters which appeared to him to indicate the existence of two species in these specimens. He remarked that in systematic works three species of the genus *Galeopithecus* are described, founded upon differences of size and colour; as regards the latter character, he had never seen two specimens which precisely agreed; and with respect to size, the dimensions given of two out of the three species are evidently taken from extremely young animals. Mr. Waterhouse then proceeded to point out the distinctive characters of the two species on the table, for which he proposed the specific names of *Temminckii* and *Phillippinensis*; of these two the first is the larger species, measuring about two feet in total length, and having a skull two inches

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eleven and a half lines in length. The anterior incisor of the upper jaw is broad and divided by two notches into three distinct lobes; the next incisor on each side has its anterior and posterior margins notched; and the first molar (or the tooth which occupies the situation of the canine) has its posterior edge distinctly notched. This tooth is separated by a narrow space anteriorly and posteriorly, from the second incisor in front, and the second molar behind; the temporal ridges converge towards the *occiput*, near which, however, they are separated usually by a space of about four lines.

The second species (*G. Philippinensis*) is usually about twenty inches in length, and has a skull two inches seven lines in length. It may be distinguished from *G. Temminckii* by the proportionately larger ears, and the greater length of the hands; the skull is narrower in proportion to its length; the muzzle is broader and more obtuse; the orbit is smaller; the temporal ridges generally meet near the *occiput*, or are separated by a very narrow space; the anterior incisor of the upper jaw is narrow, and has but one notch; the next incisor on each side is considerably larger, longer, and stronger than in *G. Temminckii*, and moreover differs in having its edges even; the same remarks apply to the first false molar. The incisors and molars here form a continuous series, each tooth being in contact with that which precedes, and that which is behind it. The most important difference perhaps which exists between the two species in question consists in the much larger size of the molar teeth in the smaller skull, the five posterior molars occupying a space of ten lines in length, whereas in *G. Temminckii*, a much larger animal, the same teeth occupy only nine lines. The above are the most prominent characteristic differences in the two species, though several other minor points of distinction may be observed.

Mr. Blythe called the attention of the Meeting to the skull of a Cumberland Ox, presenting an unnatural enlargement of the facial bones, accompanied with a most remarkable development of the horns, one of which measured four feet in circumference at its base.

The reading of Professor Owen's paper "On the Osteology of the Marsupialia," was completed. After some preliminary remarks upon the importance of the study of the skeleton, in investigating the natural groups of this order and the determination of the interesting fossils of Australia, Professor Owen proceeded in the first place to point out the principal modifications in the general form of the skull as observed in the various genera of marsupial animals.

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of the brain, and for the great expansion of the nasal cavity immediately anterior to the cranial cavity.

"In the stronger carnivorous species the exterior of the *cranium* is characterized by bony ridges and muscular impressions; but in the smaller herbivorous species, as the Petaurists and Potoroos, the *cranium* presents a smooth rounded surface as in birds, corresponding with the smooth unconvoluted surface of the simple brain contained within.

"The breadth of the skull in relation to its length is greatest in the Wombat and Ursine Dasyure in which it equals three-fourths the length, and least in the *Perameles lagotis* in which it is less than one-half. The occipital region, which is generally plane and vertical in position, forms a right angle with the upper surface of the skull, from which it is separated by an occipital or lambdoidal *crista*. This is least developed in the Myrmecobius, Petaurists, and Kangaroo, and most so in the Opossum, in which, as also in the Koala, the crest curves slightly backwards, and thus changes the occipital plane into a concavity, well adapted for the insertion of the strong muscles from the neck and back.

"The upper surface of the skull presents great diversity of character, which relates to the different development of the temporal muscles, and the varieties of dentition in the different genera. In the Wombat the coronal surface offers an almost flattened tract, bounded by two slightly elevated temporal ridges, which are upwards of an inch apart posteriorly, and slightly diverge as they extend forwards to the anterior part of the orbit.

"The skull of the Opossum presents the greatest contrast to that condition, for the sides of the *cranium* meet above at an acute angle, and send upwards from the line of their union a remarkably elevated sagittal crest, which, in mature skulls, is proportionally more developed than in any of the placental Carnivora, not even exempting the strong-jawed Hyæna.

Of the Composition of the Cranium.—"The occipital bone is developed, as in the placental Mammalia, from four centres or elements, the basilar below, the supra-occipital above, and the ex-occipitals at the sides; but these elements remain longer separate, and in some genera do not become, at any period of life, united by continuous ossification.

"In the skull of an aged Virginian Opossum I found the supra-occipital still distinct from the ex-occipitals, and these not joined together, though anchylosed to the basilar element: in this Marsupial animal they meet above the *foramen occipitale*, and complete

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its boundaries, as the corresponding superior vertebral *laminæ* complete the medullary canal, in the region of the spine. I have found the same structure and condition of the occipital bone of an adult *Dasyurus Ursinus*, and it is exhibited in the plate of the *cranium* of this species given by M. Temminck*. In the skull of a *Perameles nasuta* the ex-occipitals were separated by an interspace, so that a fissure was continued from the upper part of the *foramen magnum* to the supra-occipital element. The same structure may be observed in the Kangaroo, and is very remarkable in the young skulls of this species; I found this superior notch wide and well-marked in *Macropus Bennettii*. In the Wombat the corresponding fissure is very wide, and the lower margin of the supra-occipital is notched, so that the shape of the *foramen magnum* somewhat resembles that of the trefoil leaf. In the Koala, the Phalanger, Petaurus, Hypsiprymnus, and *Dasyurus Maugei*, the elements of the occipital bone present the usual state of bony confluence.

"The temporal bone generally presents a permanent separation of the squamous, petrous, and tympanic elements. I have observed this reptile-like condition of the bone in the mature skulls of an Ursine Dasyure, a Virginian Opossum, a Perameles, in different species of Potoroo and Kangaroo, in the Wombat, and in the Koala. So loose, indeed, is the connection of the tympanic bone, that, without due care, it is very liable to be lost in preparing the skulls of the Marsupiata.

"In the Virginian Opossum the bony palate presents eight distinct perforations besides the incisive foramina; the palatal processes of the palatine bone extend as far forwards in the median line as the third molares; a long and narrow fissure extends for an equal distance (three lines) into the palatal processes, both of the palatines and maxillaries; behind these fissures, and nearer the median line, are two smaller oblong fissures; external, and a little posterior to these, are two similar fissures, situated in the palato-maxillary suture; lastly, there are two round perforations close to the posterior margin of the bony palate.

"Now there is no carnivorous quadruped in the placental series which has a bony palate characterized by perforations and vacuities of this kind. In the dog, the cat, and the weasel tribe, the bony palate is only perforated by two small oblique canals, which open in or near the palato-maxillary suture. The very great interest which is attached to the fossil jaws of the Stonesfield Marsupials, the only mammiferous remains hitherto discovered in the secondary formations,

* *Monographie de Mammalogie*, pl. viii.

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* *Monographie de Mammalogie*, pl. viii.

its boundaries, as the corresponding superior vertebral *laminæ* complete the medullary canal, in the region of the spine. I have found the same structure and condition of the occipital bone of an adult *Dasyurus Ursinus*, and it is exhibited in the plate of the *cranium* of this species given by M. Temminck*. In the skull of a *Perameles nasuta* the ex-occipitals were separated by an interspace, so that a fissure was continued from the upper part of the *foramen magnum* to the supra-occipital element. The same structure may be observed in the Kangaroo, and is very remarkable in the young skulls of this species; I found this superior notch wide and well-marked in *Macropus Bennettii*. In the Wombat the corresponding fissure is very wide, and the lower margin of the supra-occipital is notched, so that the shape of the *foramen magnum* somewhat resembles that of the trefoil leaf. In the Koala, the Phalanger, Petaurus, Hypsiprymnus, and *Dasyurus Maugei*, the elements of the occipital bone present the usual state of bony confluence.

"The temporal bone generally presents a permanent separation of the squamous, petrous, and tympanic elements. I have observed this reptile-like condition of the bone in the mature skulls of an Ursine Dasyure, a Virginian Opossum, a Perameles, in different species of Potoroo and Kangaroo, in the Wombat, and in the Koala. So loose, indeed, is the connection of the tympanic bone, that, without due care, it is very liable to be lost in preparing the skulls of the Marsupiata.

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will justify the minuteness, perhaps tediousness, with which I have dwelt on characters that, inclusive of the teeth, serve to distinguish the *cranium* of the Marsupial from that of any placental quadruped. The structure of the bony palate in the Marsupiata is interesting in other respects. Since the defective condition of this part of the *cranium* is one of the characteristics of the skull of the bird, it might be expected that some approximation would be made to that structure in the animals which form the transition between the placental and oviparous classes. We have already noticed the large vacuities which occur in the bony palate of nearly all the Marsupials, but this imperfectly ossified condition is most remarkable in the Acrobates and *Perameles lagotis*. In the latter the bony roof of the mouth is perforated by a wide oval space, extending from the second spurious molars to the penultimate molars, exposing to view the vomer and convolutions of the inferior spongy bones in the nasal cavity. Behind this space there are six small perforations; two in a transverse line, midway between the great vacancy and the posterior margin of the bony palate, and four in a transverse line, close to that margin.

"In the Ursine Dasyure a large transversely oblong aperture is situated at the posterior part of the palatal processes of the maxillary bones, and encroaches a little upon the palatines; this aperture is partly, perhaps in young skulls, wholly bisected by a narrow longitudinal osseous bridge. The large aperture in the skull of the *Dasyurus Ursinus*, figured by Temminck, is the result of accidental injury to the bony palate.

"The lower jaw of the marsupiata is a part of their osseous structure which claims more than ordinary attention, in consequence of the discussions to which the fossil specimens of this bone, discovered in the oolitic strata of Stonesfield, have given rise. I have examined the two specimens in the possession of Dr. Buckland, the specimen formerly in the collection of Mr. Broderip, and that which is preserved in the Museum at York; the composition of the lower jaw, each ramus of which consists of one piece of bone, the convex condyle, and the double fangs of the molar teeth, prove the mammiferous character of these remains; the size, elevation, and form of the coronoid process of the lower jaw, the production of the angle of the jaw, with the development of the canines, and the pointed tubercular crowns of the molar teeth, indicate the carnivorous and insectivorous character of the species in question. The number of the incisors, eight in the lower jaw, and the structure and proportions of the molar teeth, approximate these small *insectivora* most nearly to the smaller species of the modern genus *Didelphis*; but will justify the minuteness, perhaps tediousness, with which I have dwelt on characters that, inclusive of the teeth, serve to distinguish the *cranium* of the Marsupial from that of any placental quadruped. The structure of the bony palate in the Marsupiata is interesting in other respects. Since the defective condition of this part of the *cranium* is one of the characteristics of the skull of the bird, it might be expected that some approximation would be made to that structure in the animals which form the transition between the placental and oviparous classes. We have already noticed the large vacuities which occur in the bony palate of nearly all the Marsupials, but this imperfectly ossified condition is most remarkable in the Acrobates and *Perameles lagotis*. In the latter the bony roof of the mouth is perforated by a wide oval space, extending from the second spurious molars to the penultimate molars, exposing to view the vomer and convolutions of the inferior spongy bones in the nasal cavity. Behind this space there are six small perforations; two in a transverse line, midway between the great vacancy and the posterior margin of the bony palate, and four in a transverse line, close to that margin.

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"The marsupial bones are elongated, flattened, and more or less curved, expanded at the proximal extremity, which sometimes, as in the Wombat, is articulated to the *pubis* by two points; they are relatively longest, straightest, and most slender in the Perameles; flattest, broadest, and most curved in the Koala. They are always so long that the cremaster muscle winds round them in its passage to the

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testicle or mammary gland; and the uses of these bones immediately relate to those muscles.

"With reference to the interesting question—What is the homology or essential nature of the ossa marsupialia? I have, on a previous occasion, discussed that problem before the Zoological Society, and have not found reason to change the opinion I offered in 1835*; *viz*. that they belong to the category of the trochlear ossicles, commonly called sesamoid, and are developed in the tendon of the external oblique which forms the mesial pillar of the abdominal ring, as the patella is developed in the *rectus femoris*. They are not, however, merely subservient to add force to the action of the 'cremasteres,' but give origin to a great proportion of the so-called 'pyramidales.'

"The *osteogenesis* of the marsupial pelvis derives some extrinsic interest from the not yet forgotten speculations which have been broached regarding the analogies of the marsupial bones. These have been conjectured to exist in many of the placental Mammalia, with a certain latitude of altered place and form, disguised, e. g. as the bone of the *penis* in the Carnivora, or appearing as the supplemental ossicles of the acetabulum, which exist in the young of many of the Rodentia. In the os innominatum of the immature Potoroo, the curved prismatic *ilium* contributes to form by the outer part of its base the upper or anterior third of the acetabulum; the rest of the circumference of this cavity is completed by the *ischium* and *pubis*, excepting a small part of the under or mesial margin, which is formed by a distinct ossicle or epiphysis of the ilium, analogous to that described by Geoffroy St. Hilaire as the rudimental marsupial bone in the rabbit. Now here there is a co-existing marsupial bone: but besides the five separate bones just mentioned, there is a sixth distinct triangular ossicle, which is wedged into the posterior interspace of the ischio-pubic symphysis. How easy to suggest that this single symmetrical bone may be the representative of the *os penis* removed from the glans to the root of the intromittent organ! It is obviously a mere epiphysis of the ischium. The circumference of the acetabulum is always interrupted by a deep notch opposite the obturator-foramen, which is traversed by a ligamentous bridge, and gives passage to the vessels of the Harderian gland lodged in the wide and deep acetabular fossa.

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"The *osteogenesis* of the marsupial pelvis derives some extrinsic interest from the not yet forgotten speculations which have been broached regarding the analogies of the marsupial bones. These have been conjectured to exist in many of the placental Mammalia, with a certain latitude of altered place and form, disguised, e. g. as the bone of the *penis* in the Carnivora, or appearing as the supplemental ossicles of the acetabulum, which exist in the young of many of the Rodentia. In the os innominatum of the immature Potoroo, the curved prismatic *ilium* contributes to form by the outer part of its base the upper or anterior third of the acetabulum; the rest of the circumference of this cavity is completed by the *ischium* and *pubis*, excepting a small part of the under or mesial margin, which is formed by a distinct ossicle or epiphysis of the ilium, analogous to that described by Geoffroy St. Hilaire as the rudimental marsupial bone in the rabbit. Now here there is a co-existing marsupial bone: but besides the five separate bones just mentioned, there is a sixth distinct triangular ossicle, which is wedged into the posterior interspace of the ischio-pubic symphysis. How easy to suggest that this single symmetrical bone may be the representative of the *os penis* removed from the glans to the root of the intromittent organ! It is obviously a mere epiphysis of the ischium. The circumference of the acetabulum is always interrupted by a deep notch opposite the obturator-foramen, which is traversed by a ligamentous bridge, and gives passage to the vessels of the Harderian gland lodged in the wide and deep acetabular fossa.

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"In the great Kangaroo the fibula is a distinct bone throughout, but it is remarkably thinned and concave at its lower half, so as to be adapted to the convexity of the tibia, with which it is in close contact. In each of these genera therefore, in which locomotion is principally performed by the hinder extremities, fixity and strength is gained by the structure of the bones of the leg. In the other genera, as *Phascolarctos*, *Phascolomys*, *Phalangista*, *Petaurus*, *Didelphis*, and *Dasyurus*, the tibia and fibula are so connected together, and with the tarsus, that the foot enjoys a movement of rotation analogous to the pronation and supination of the hand; and in the Petaurists, Phalangers, Opossums, and Koala, the inner toe is so placed and organized as to perform the office of an opposable thumb, whence these Marsupiata have been termed pedimana or foot-handed. It is to this prehensile power that the modifications of the fibula chiefly relate. In the Wombat, Koala, Petaurists, and Phalangers it expands to nearly an equal size with the tibia at the distal extremity, and takes a large share in the formation of the tarsal joint; but the articular surface is slightly convex, while that of the tibia is slightly concave.

"The analogy of the carpal and tarsal bones is very clearly illustrated in the Wombat. The anchylosed *naviculare* and *lunare* of the hand correspond with the astragalus and naviculare of the foot, transferring the pressure of the *focile majus* upon the three innermost bones of the second series. The long backward projecting pisiform bone of the wrist closely resembles the posterior process of the *os calcis*; the articular portion or body of the *os calcis* corresponds with the cuneiform; the large unciform represents the cuboides, and performs the same function, supporting the two outer digits; the three cuneiform bones are obviously analogous to the *trapezium*, *trapezoides*, and *os magnum*.

"The commencement of a degeneration of the foot, which is peculiar to, and highly characteristic of, the Marsupial animals, may be discerned in the Petaurists, in the slender condition of the second and third toes, as compared with the other three. In the Phalangers, this diminution of size of the second and third toes, counting from the thumb, is more marked. They are also both of the same length, and have no individual motion, being united together in the same sheath of integument as far as the ungueal phalanges, whence the name of *Phalangista* applied to this genus. In the saltatorial genera of Marsupiata the degradation of the corresponding toes is extreme; but though reduced to almost filamentary slenderness, they retain the usual number of phalanges, the terminal ones being armed with

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November 13, 1838.—Professor Owen, in the Chair.

Professor Owen exhibited to the Meeting two skulls of the full-grown Koala (*Lipurus cinereus*, Goldf., *Phascolarctos*, Bl.), and two of immature specimens of the same species, and demonstrated the peculiarities of the *cranium*, and especially the condition of the *dental* system.

In both the adult *crania* the *dental formula* was as follows:

$$Incis.\ \frac{3-3}{1-1},\ canin.\ \frac{1-1}{0-0},\ præmol.\ \frac{1-1}{1-1},\ mol.\ \frac{4-4}{4-4} = 30:$$

it thus corresponds numerically with the formula of the genus *Hypsiprymnus*, and differs only in the absence of a few minute, inconstant, and functionless teeth from the dentition of many of the *Petaurists* and *Phalangers*. The true *molares* in the *Koala* are, however, relatively larger and stronger than in the *Potoroos* and *Phalangers*, yet present the same general structure; each molar is beset with four three-sided pyramids, the sharp apices of which soon become blunted by trituration, and the outer series in the upper grinders are the first to be worn down; the posterior grinder is a little smaller than the rest in the upper jaw; the true *molares* of the lower jaw are equal amongst themselves, but narrower than those of the upper jaw. The crowns of the *præmolares*, or false grinders, are subtriangular, broadest behind, compressed, and terminate in a cutting edge; those of the upper jaw have a ridge extended along the inner side of their base; they do not exceed in antero-posterior extent the crowns of the true grinders. The true *molares* of the upper jaw have four fangs; those of the lower jaw, and the *præmolares* in both jaws, have two fangs. The *canines* are situated close to the *maxillo-incisive* suture, distant from the *præmolares* half an inch; they are very small, and do not extend beyond the alveolar margin further than two lines; they terminate in an oblique cutting edge, and their simple fang is closed at its extremity. Two lines anterior to the *canines* begin the series of *incisors*, of which the four posterior ones are of the same size as the *canines*; the pair immediately behind the large anterior *incisors* have their crowns worn flat by the appulse of the two large *incisors* below. The two anterior *incisors*, upper jaw, are twice as long, and as broad and thick as the posterior ones; their crown is conical, slightly curved, subcompressed, beveled off obliquely to an anterior cutting edge, and having a partial coating of enamel, but differing from true *dentes scalprarii* in having the extremity of the fang contracted and closed. The two *incisors* of the lower jaw are longer, straighter, and more compressed than the cor-

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responding pair above; the enamel is confined to the anterior and lateral surfaces of the crown; but this, though beveled off from behind forwards, terminates in a blunt apex by attrition against the small middle *incisors* of the upper jaw; the posterior surface of the crown is impressed with a narrow longitudinal groove. These *incisors*, like those above, are developed by a temporary pulp, and have the fang contracted and solidified. In this respect the *Koala* resembles the *Phalangers*, and differs from the *Potoroos*, which have the fang of the large anterior *incisors* open for the reception of a persistent pulp. In the compressed and sectorial structure of the *præmolares* of the *Koala*, we perceive, however, an evident transition to the characteristic form of these teeth in *Hypsiprymnus*; but in this genus the *præmolares* are still more compressed, and are remarkable for their antero-posterior extent, which dimension becomes excessive in the arboreal *Potoroos* of New Guinea.

So far, therefore, as the affinities of a Marsupial quadruped are indicated by its teeth, the position assigned to the *Koala* by Latreille*, viz. next to the *Phalangers*, must be regarded as more natural than that which it occupies in the 'Règne Animal' of Cuvier, viz. between the *Kangaroos* and *Wombat*. From the *Kangaroos* the *Koala* differs in the presence of *canines* in the upper jaw; and still more so from the *Wombat*, which has neither *canines* nor posterior *incisors*; whereas the *Koala* not only closely resembles the *Phalangers* and *Petaurists* in the correspondence as to number, kind, and conformation of its teeth, as compared with the functionally developed teeth of those genera, but also agrees with them in the conformation of its digestive organs, having a simple stomach, and a very long cæcum. In the *Wombat*, on the contrary, the cæcum is short and wide, and has a vermiform appendage. Both the *Potoroos* and *Kangaroos* differ from the *Koala* and *Phalangers* in their large sacculated stomach and relatively shorter cæcum; but the *Potoroos*, in the comparative simplicity of this organ, as well as in the presence of superior canine teeth, have clearly the nearer affinity to the *Koala*. Since, moreover, the *Petaurists* have canines in both jaws like the *Phalangers*, while the *Koala* possesses them only in the upper jaw, the place of the *Petaurists* should be between the *Phalangers* and *Koala*, and not, as in Latreille's system, between the *Kangaroos* and *Potoroos*; and Professor Owen proposed to include the *Koala* with the *Phalangers* and *Petaurists* in one subdivision, and to join the *Potoroos* with the *Kangaroos* to form another and distinct primary group of Marsupialia.

* Familles Nat. du Règne Anim. p. 53.

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So far, therefore, as the affinities of a Marsupial quadruped are indicated by its teeth, the position assigned to the *Koala* by Latreille*, viz. next to the *Phalangers*, must be regarded as more natural than that which it occupies in the 'Règne Animal' of Cuvier, viz. between the *Kangaroos* and *Wombat*. From the *Kangaroos* the *Koala* differs in the presence of *canines* in the upper jaw; and still more so from the *Wombat*, which has neither *canines* nor posterior *incisors*; whereas the *Koala* not only closely resembles the *Phalangers* and *Petaurists* in the correspondence as to number, kind, and conformation of its teeth, as compared with the functionally developed teeth of those genera, but also agrees with them in the conformation of its digestive organs, having a simple stomach, and a very long cæcum. In the *Wombat*, on the contrary, the cæcum is short and wide, and has a vermiform appendage. Both the *Potoroos* and *Kangaroos* differ from the *Koala* and *Phalangers* in their large sacculated stomach and relatively shorter cæcum; but the *Potoroos*, in the comparative simplicity of this organ, as well as in the presence of superior canine teeth, have clearly the nearer affinity to the *Koala*. Since, moreover, the *Petaurists* have canines in both jaws like the *Phalangers*, while the *Koala* possesses them only in the upper jaw, the place of the *Petaurists* should be between the *Phalangers* and *Koala*, and not, as in Latreille's system, between the *Kangaroos* and *Potoroos*; and Professor Owen proposed to include the *Koala* with the *Phalangers* and *Petaurists* in one subdivision, and to join the *Potoroos* with the *Kangaroos* to form another and distinct primary group of Marsupialia.

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LINNÆAN SOCIETY.

April 16, 1839—The Lord Bishop of Norwich, President, in the Chair.

Read, "Remarks on British Lichens and Fungi, principally on species or varieties new to our Flora." By Churchill Babington, Esq.

The object of Mr. C. Babington in this paper is to give descriptions of some species or varieties of Lichens and Fungi hitherto unpublished in any British Flora, and also to communicate observations on the transit of monstrosities to their proper forms. The Lichens brought into notice as not yet introduced into the British Flora are, *Lecanora elatina*, Ach., from Rose Hall, Cumberland; *Stereocaulon denudatum*, Flörke, (confounded with *S. paschale*) from Scotland; *Lecidea nitidula*, Fries, also from Scotland; *Lecidea miscella*, Ach., as distinct from *L. miscella*, Eng. Bot.; *Biatora Krockiana*, Hoppe, from Isles of Rum and Skye; *Biatora anomala*, Fr., from Yoxall Lodge; *Opegrapha signata*, Ach., from Herefordshire; and *Verrucaria margacea*, Wahl., from Charnwood Forest. Among the Fungi are, *Agaricus Mariæ*, Klotsch; *A. serrulatus*, Fr.; *Thelophora ferruginea*, Pers.; *T. lactea*, Fr.: *T. lævis*, Pers.; *Peziza Ledi*, Alb. and Schw.; *Stictis lichenicola*, Mont.; *Sclerotium roseum*, Kneiff.; *Sphæria scoriadea*, Fr.; *S. mesiota*, Bab.; *S. rhytismoides*, Bab.; *S. arbuticola*, Fr.; *S. alnea*, Fr.; *S. ostruthii*, Fr.; *S. Depazea*, Fr.; *Depazea pyricola*, Desm.; *Dothidea chætomium*, Kunze; *Stemonitis pulchella*, Bab.; *Stilbum aurantiacum*, Bab.; *Syzygitis megalocarpus*, Ehrenb.; *Stilbospora macrosperma*, Pers.; *Coniothecium amentaceum*, Corda; and *Xenodochus carbonarius*, Schl.

Read, "On a Gall gathered in Cuba, by W. S. MacLeay, Esq., on the leaf of a plant belonging to the order *Ochnaceæ*." By the Rev. M. J. Berkeley, M.A., F.L.S.

The gall is remarkable for its very close resemblance in habit and form to some epiphytous Fungi, for possessing a distinct operculum, and, especially, for bursting through the cuticle, which surrounds it in the form of a few laciniæ at the base. Mr. Berkeley pointed out various forms of galls and other productions of insects which have been described as Fungi, but in none is the resemblance so striking as in the present. He regretted that he was not able to throw any light upon the animal by which it is caused, though he was able to state positively that it is an animal production, as in most instances decayed exuviæ were found in its cavity, and in one case a little imperfect grub, which was however unfortunately lost.

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May 7, 1839.—The Lord Bishop of Norwich, President, in the Chair.

Read, " Supplementary Observations on the Development of the Theca, and on the Sexes of Mosses." In a letter to R. H. Solly, Esq., F.R.S. & L.S. By William Valentine, Esq., F.L.S.

The author commences his letter by stating that subsequent observations have induced him to concur entirely with the views of Professor Mohl as to the sporules of Mosses being developed by four in a mother cell, a fact which he was led to doubt in his former communication printed in the 17th volume of the Society's Transactions. The present paper contains a detailed account of the development of the theca in *Œdipodium Griffithianum*, which exhibits a beautiful example of the tetrahedral union of the sporules. In this moss the four sporules in each mother cell are piled on each other so as to form a cone with a triangular base, and they appear to be connected with each other in the young state by a very minute stalk which is situated at the conjunction of three radiating lines. This connexion is perhaps in most instances dissolved at an early period, and the sporules recede a little from each other, but are still kept in the triangular form by the mother cell. It is not uncommon however to find the connexion unbroken after the sporules have arrived at maturity, and in these instances there seems to be a general adhesion at the opposing faces of the sporules.

The author concludes his paper with some remarks on the analogy that exists between sporules and pollen, which he observes, is so remarkable, and the particulars so numerous, that the essential identity of the two can be scarcely a matter of opinion.

May 24, 1839.—The Lord Bishop of Norwich, President, in the Chair.

This day, the Anniversary of the birthday of Linnæus, and that appointed in the charter for the election of Council and Officers, the President opened the business of the Meeting, and in stating the number of Members whom the Society had lost during the past year, gave the following notices of some of them :

Samuel Brookes, Esq.—Mr. Brookes was devoted to the science of Conchology, and possessed a valuable collection of British and Foreign Testacea. He was the author of an Introduction to the Study of Conchology which appeared in 1815.

The Rev. Martin Davy, D.D., F.R.S., Master of Caius College, Cambridge.

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Charles Holford, Esq.

Lawrence Brock Hollinshead, Esq.

John Hull, M.D.—Dr. Hull was ardently attached to the study of Botany, and in the midst of an extensive medical practice, he found occasional moments of leisure to devote to the cultivation of his favourite pursuit. We are indebted to him for the publication of a British Flora in 1799, of which a second edition appeared in 1808; and the Elements of Botany, in 2 volumes, 8vo, in 1800. These works, highly creditable to their author, tended to increase the taste for botanical pursuits.

Matthew Martin, Esq.—Mr. Martin reached the advanced age of 90. He became a Fellow of this Society in 1791.

George Milne, Esq.—Mr. Milne pursued with much ardour the study of Entomology for more than half a century, and his name is familiar to the cultivators of that branch of science in this country. He possessed an extensive cabinet of insects, particularly rich in British and Exotic Lepidoptera. He had retired from London for several years to his native place Johnshaven, Kincardineshire, where he died some months ago at an advanced age.

The Rev. Robert Nixon, B.D., F.R.S.

William Younge, M.D.—Dr. Younge was the early friend and a fellow student of our late distinguished President and Founder Sir J. E. Smith, and the companion of his tour on the continent in the years 1786 and 1787, of which an account appeared in three volumes 8vo, in 1793, and a second edition in 1807. Dr. Younge was elected a Fellow of this Society at its first institution in March 1788.

Amongst the Foreign Members occur *M. Frédéric Cuvier*, Member of the Academy of Sciences of the French Institute, the younger brother of the great Cuvier, and eminently distinguished as a systematic zoologist. He was the author of a work on the value of the teeth as affording zoological characters in the class mammalia, and of a number of valuable papers on Descriptive Zoology in the Annales et Mémoires du Muséum. He likewise wrote the principal part of the text to the Histoire Naturelle des Mammifères, a work which he had undertaken in conjunction with Geoffroy St. Hilaire. Among his last productions may be noticed his Mémoire sur les Gerboises et les Gerbilles, printed in the second volume of the Transactions of the Zoological Society of London. He was distinguished, like his brother, for his candour and frankness of character, and a total freedom from those petty jealousies which too often beset men of science.

M. Charles de Gimbernat.

Gaspard Count Sternberg, Founder and President of the Royal

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In the latter portion of this letter the author endeavours (in addition to what has been already stated at p. 58) to demonstrate the *vegetability* of the river sponge, from the following facts, which were obtained by many experiments made by him upon that substance during the last two summers.

1. From the general resemblance of the membrane which invests the soft portion or jelly with the membrane or cuticle of the leaves of many plants.

2. From this gelatinous or soft portion being so similar to the parenchymatous substance of the more fleshy kinds of leaves, and being, like the latter, chiefly composed of numerous pellucid globules.

3. From the green colouring matter or chromule contained in those globules, on being pressed out, giving a permanent green or yellowish-green colour to white paper, as is the case with the chromule of leaves and plants.

4. From strong acids having the same effects on this sponge as they are seen to have upon plants when they are macerated in them.

5. From the mode in which numerous bubbles of gas, most probably oxygen, are disengaged from the surface of the living mass of *Spongilla*, when exposed to the brightest solar light, being so extremely analogous to that which is known to occur with the leaves of a plant when immersed in water and submitted to the direct action of the light of the sun.

As to the currents of water which take place in the *Spongilla fluviatilis*, and are so similar to those which have been noticed by Dr. Grant and other authors in the sea sponges, and relied upon by them as the best evidence of their supposed animal nature, Mr. Hogg has, after many careful experiments, never been able to witness them taking place in any specimens which have been entirely destitute of every parasitical insect or other animal; he therefore concludes that these currents are caused by some insect, or crustacean, or molluscan, which is seen so generally to inhabit nearly every specimen of the *Spongilla*; and by means of the animal's performing the function of respiration, the streams or currents of water are found to enter into and flow out from the pores or oscules of that structure. But if on future investigations it shall be proved that these currents do occur in such individual masses of the *Spongilla fluviatilis* as are quite free from every parasite, Mr. Hogg would then consider that they are effected by the same agents as cause the motions or circulation of the fluids in vegetables, and most probably by an endosmosis and exosmosis of different fluids, in accordance with the important discoveries of M. Dutrochet.

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The author has not perceived any trace of animal organization, or the least symptom of sensation, or any powers of contraction and dilatation in this species of sponge, although he has applied to it, when in a fresh and vigorous state, several sorts of powerful stimulants.

He next showed that no arguments in support of the fancied animality of the *Spongilla* can be brought forward, either from its smelling like carrion or animal matter, or from numerous spiculæ being present in its composition. And the manner in which he raised young *Spongillæ* from the seed-like sporidia and locomotive sporules makes it perfectly conclusive that this freshwater sponge cannot be, as Montagu supposed, the nidus of some aquatic insect, although such an opinion might, without those successful experiments, have been somewhat confirmed by the author's discovery of an unknown and anomalous insect, which he has at present only observed inhabiting this production. Some specimens of this small insect were exhibited, and presented to the Society.

Mr. Hogg concluded his letter with some general remarks on the nature of the *Spongiæ marinæ.* He stated that hitherto he had always accounted these substances as being principally composed of an animate or live jelly, which was endowed, as some authors affirmed, with a certain degree of palpitation and contraction, and dilatation, and consequently had, fourteen years ago, instituted for them an order "*Gelatinifera,*" which he arranged the last among the *Polyparia Composita.* That on becoming convinced by his late researches on the river sponge of its vegetability, he began in some measure to concur in the opinion of Montagu, that that substance might probably be quite distinct from the sea sponge, and to think that the latter might still be of an animal nature; but, on a more recent examination and comparison of the *Spongilla* with many of the *Spongiæ,* he has found that there exist no real grounds for that opinion, and that there scarcely is even a generic difference between them.

The author then compared the freshwater sponge with the sea sponge, and showed, among other extreme resemblances in their structure and composition, that many of the latter possess similar seed-like bodies or sporidia, as well as the locomotive germ-like bodies or sporules which have been described by Dr. Grant.

Mr. Hogg concludes, if the currents of water do flow in and issue out from the sea sponge, independent of the function of respiration of any marine insect or parasitical animal nestling within it, that then they are caused by the same means which effect the motions of fluids in plants, and that these currents convey nutriment to the inner parts of the sponge, after the same manner as food is supplied

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The author then compared the freshwater sponge with the sea sponge, and showed, among other extreme resemblances in their structure and composition, that many of the latter possess similar seed-like bodies or sporidia, as well as the locomotive germ-like bodies or sporules which have been described by Dr. Grant.

Mr. Hogg concludes, if the currents of water do flow in and issue out from the sea sponge, independent of the function of respiration of any marine insect or parasitical animal nestling within it, that then they are caused by the same means which effect the motions of fluids in plants, and that these currents convey nutriment to the inner parts of the sponge, after the same manner as food is supplied

The author has not perceived any trace of animal organization, or the least symptom of sensation, or any powers of contraction and dilatation in this species of sponge, although he has applied to it, when in a fresh and vigorous state, several sorts of powerful stimulants.

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to all vegetables. He observed that neither the odours of the fresh, dried, and burnt sponges, nor the presence of ammonia in them, afforded proofs of their animality, and that there really is no more peculiarity in their chemical composition than what likewise exists in that of certain plants.

Mr. Hogg therefore maintains it to be impossible to account the *Spongilla* as belonging to the vegetable kingdom and the *Spongia* to the animal; and since he has become sure of the former, and since the *Spongia* is now known to possess neither one organ nor a single property peculiar to an animal, he has been at length forced to acknowledge the vegetable nature of the *Spongia*.

Moreover, the fact of Dr. Grant having witnessed the locomotive sporules of some of the sea sponges germinating and developing themselves after the forms of their parent structures, at once decides that they cannot be the nidus or matrix, or the fabrication or production of any marine animal.

Lastly, Mr. Hogg, considering to what order of plants the fresh-water and the sea sponges should be referred, proposed to classify them in a separate order "Spongiæ," which ought to be placed between the order Fungi and that of the Algæ.

MISCELLANEOUS.

ON THE STRUCTURE OF THE *VOLVOCINÆ*.

M. Ehrenberg observes, "that with respect to the organization of the genus *Volvox*, all endeavours to acquire some knowledge of it have only proved successful, now that observation has been at last directed to the right depth (1833). Formerly the entire globule was generally regarded as a single verrucose or ciliated animalcule, and its bursting considered as the reproduction of simple individuals. But this view leads to wonders and to contradictions; it is evidently erroneous, and the organic relations lie much deeper. Each globule is a hollow *monadier* (Monadenstock) of many hundreds, nay, thousands of minute animalcules; and within this, several smaller globules are developed, which however are not single individuals, but also *Monadiers*. The single animals are those small greenish warts or points on the surface, and they resemble the Monads. Each animalcule bears precisely the same relation as a single animal of *Gonium pectorale*; it possesses a gelatinous shield open anteriorly, which when full-grown it can leave, and is connected by three to six thread-like tubes with the neighbouring individuals. It is evi-

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